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Physicians accelerate onto the Internet.  
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ABSTRACT: Physicians are not only using the Internet to speed up research but to recruit patients and research partners as well. At the Webnet World 1997 conference in Toronto, several researchers claimed that their research was shortened by years because they found information on the World Wide Web. Many scientists are posting bacterial genetic sequences as well as the genetic profile of cancer cells. One researcher recruited 127 women for a study within six months of posting information about the study on the Web. Many physicians are contacted in this way by patients all around the world.

TEXT:

Biophysicist Krzysztof Wroblewski, (University of Pennsylvania, Philadelphia, PA, USA) was frustrated. He knew that many pregnant women have ultrasound scans to screen for heart defects in their unborn babies. But the potential benefits of this technique are limited by the examining physician's experience in analysing the images. "Unless they are obvious", says Wroblewski, "many congenital heart abnormalities remain undetected".

Out of Wroblewski's frustration was born the Fetal Echocardiography Homepage, "a tool to help non-cardiologists effectively read and analyse echocardiographic data". The website, which features a growing library of normal and abnormal fetal heart scans for doctors to compare with their own images, was highlighted at Webnet World 1997 (Toronto, Canada; Nov 1-5).

Microbiologist Herbert Schweizer of the Colorado State University (Fort Collins, CO, USA) turned to the web when development of a screening system for drugs to combat *Pseudomonas aeruginosa* reached an impasse. "We were missing two key proteins that we postulated were involved in turning *P. aeruginosa* into an infectious agent", he recalls. By searching the *Pseudomonas* Genome Project website, a collaboration between the US Cystic Fibrosis Foundation, the University of Washington (Seattle, WA, USA), and the Seattle-based biopharmaceutical company, PathoGenesis, Schweizer found candidate genes for the proteins. Without the site, he says, "we would have taken at least 2 more years to get this far".

Traditionally, genetic sequences are not released until a project is completed, explains PathoGenesis' Rick Garber. "By the time you've wrapped the last bow tie around it and waited for publication, you can be waiting 2-3 years. We've posted more than 85% of the *P. aeruginosa* sequence in 4 5 months." The result is that "labs around the world now have a powerful tool that could put their research way ahead of where they would be without it", so hastening development of new therapies.

A more ambitious site with similar aims is the Cancer Genome Anatomy Project (CGAP) of the US National Cancer Institute. This contains regularly updated, searchable databases of DNA sequences, cDNA libraries, and clone arrays for lung, prostate, colon, breast, and other common cancers. Eventually, says molecular biologist Robert Strausberg, we will be able to describe a cell's genetic profile at each stage of cancer development. This information could help identify precancerous cells and could help doctors decide the best treatment regimen for their patients based on tumour characteristics. And CancerNet, a vast site developed by NCI's

International Cancer Information Center (ICIC), explains the clinical relevance of the genetic findings for health professionals, researchers, and the public, adds ICIC director Susan Hubbard.

The **Internet** and its graphical portion, the worldwide **web**, are transforming medical education and research in many ways, says Ramsey Badawi, coordinator of the World Congress on the **Internet** in Medicine (MEDNET 97, Brighton, UK-1 Nov 3-6). An increasingly important use, for example, is for patient recruitment for **clinical trials** and genetic **studies**, a process facilitated by **online enrolment** forms and e-mail.

Stephen Kennedy, a senior fellow in Oxford's Nuffield Department of Obstetrics and Gynaecology, UK, has helped create such a site to **enrol** sister-pairs into OXEGENE, a study looking for endometriosis susceptibility genes. "It's extraordinary how many women we can access this way", says Kennedy. Within 6 months of the site's inauguration, 127 eligible women around the world had volunteered for the study. By contrast, it took 4 years to recruit 395 volunteers with traditional methods such as advertisements and referral.

Margaret Pericak-Vance, director of the Center for Human Genetics at Duke University (Durham, NC, USA) says that it is the patients who are driving researchers and clinicians to the web. "I'm surprised at the growing number of patients and families who have web access, read what's going on in research at sites set up by lay organisations, and contact us. It's fantastic."

Similarly, Melvin Garrett of the US Glaucoma Research Foundation says his group's site has "tremendously accelerated" enrolment for a study on primary open-angle glaucoma. And Karen London, founder of the US National Alliance for Autism Research, says the web has "revolutionised the way that a small, non-profit organisation can reach out to families, clinicians, and scientists". Several of NAAR's Board members first learned of the organisation through the website, which is helping to recruit families for a large US autism study.

The web is facilitating global communication on many medical fronts. Recently, a group of geneticists in Spain contacted Pericak-Vance through the Duke site to discuss collaborating. "We really hadn't heard anything from Spanish researchers before", she says. "I get e-mails from people in India, Pakistan, Japan -- all over", adds Hubbard. "We're reaching patients and physicians in Europe, Asia, and third-world countries as never before, and getting the information out in a way that's fast, cheap, and universal."

"As primary-care physicians are increasingly called upon to get involved in the genetic aspects of medicine, information on the web will be used even more", says Pericak-Vance. "The web is a tremendous resource and I think we're just beginning to find out what it's capable of doing for us."

RELATED ARTICLE: Where to find the resources discussed in this feature(\*)

Cancer Genome Anatomy Project (CGAP) [www.ncbi.nlm.nih.gov/ncicgap/](http://www.ncbi.nlm.nih.gov/ncicgap/)  
CancerNet [cancernet.nci.nih.gov/](http://cancernet.nci.nih.gov/) Duke University's Medical Genetics section  
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[oxegene.htm](http://oxegene.htm) Pseudomonas Genome Project [www.pseudomonas.com/](http://www.pseudomonas.com/)

(\*) Direct links to these sites will be online at [www.thelancet.com/](http://www.thelancet.com/)

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